

PATENT SPECIFICATION

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(54) SEALING MEANS AND PACKAGING MACHINE

(71) We, MULTIVAC SEPP HAGENMULLER KG, of 8941 Wolfertschwenden, Federal Republic of Germany a German Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a sealing means and to packaging machines including them. A sealing means is known from e.g. German Patent 2,323,409 of the present applicant or from German Patent 1,939,216, in which two tool portions are movable with respect to one another to close onto the work to be sealed, and there is a sealing tool arranged in one of the two portions and adapted to be moved onto the work. The other tool portion has an anvil surface against which the sealing tool pushes the work to be sealed during the formation of the seal. The materials being sealed together are portions of thin materials such as paper or film webs and the effect of the sealing is to enclose a container wholly or partly made up of those webs.

A sealing means of this kind may be used with packaging machines, especially vacuum packaging machines, such as are also known from the above mentioned printed publications. In these the anvil surface is formed of rubber and has a smooth surface. When the webs or films are sealed the problem arises that a plastics material web or film contacting the anvil adheres to some extent to it after the sealing operation. Such adhesion can be reduced by powdering the plastics material. With goods intended for medical use such as syringes, however, powdering is impossible in view of the required degree of cleanliness. Furthermore, especially for packaging objects of this kind, paper can be used as a cover of the container, and if adhesion of the plastics material to the anvil occurs the fresh seal joints between the paper and plastics are very easily torn.

The reduction or avoidance of adhesion to the anvil is clearly desirable, and accordingly we provide a sealing means in which the

anvil, which presses against the sealing tool to seal webs of thin packaging material between them, has a resilient contacting surface which is roughened, having protrusions and/or depressions. When the tool and anvil are pressed together the resilience of the rough surface allows the surface to be compressed so as to produce an effectively substantially smooth surface on the anvil but which exerts uneven pressure on the webs so that the seal formed is peelable. On release of the pressure between the anvil and tool, the surface reverts unevenly to its unstressed condition and in doing so encourages the release of the webs from the contacting surface of the anvil. This overcomes the common difficulty of the webs adhering to the anvil after sealing and at the same time produces a satisfactory but peelable seal.

Thus according to the invention, there is provided a sealing means for peelably sealing together two webs of packaging material comprising a heatable sealing tool and an anvil arranged for relative reciprocating movement to press together and seal together those webs between them, said anvil having a resilient contacting surface facing said sealing tool, and said sealing tool having a smooth surface facing said contacting surface, and wherein the said resilient contacting surface is rough, being formed of protrusions and/or depressions which cooperate with the smooth sealing surface when the two said surfaces are pressed together, with the webs to be sealed between them, to provide a substantially smooth surface exerting uneven pressure on the webs and on movement apart of the sealing tool and anvil the protrusions and/or depressions are restored to their normal position thereby ensuring disengagement of the packaging material from the said contacting surface.

Preferably, the resilient contacting surface is formed of a multiplicity of depressions and protrusions which are substantially uniformly spaced and discrete, and more preferably the resilient contacting surface is provided with elevated longitudinal and transverse zones and with pyramidal depressions or with indented longitudinal and transverse zones and with

pyramidal protrusions.

There is also provided a method of peelably sealing together two webs of packaging material including positioning the webs between a smooth sealing surface of a heatable sealing tool and a resilient contacting surface of an anvil, said sealing tool and anvil being arranged for relative reciprocating movement, pressing together said sealing tool and anvil so as to seal together the webs and moving apart said sealing tool and anvil to release the sealed webs, said resilient contacting surface of the anvil being rough, being formed of protrusions and/or depressions which on pressing together the sealing tool and anvil cooperate to provide a substantially smooth surface exerting during sealing uneven pressure on the webs against the smooth sealing surface and which on moving apart the sealing tool and anvil are restored to their normal position thereby ensuring disengagement of the packaging material from the contacting surface.

A particular embodiment of the invention will now be described with reference to the accompanying drawings, wherein:—

Fig. 1 is a sectional view through an embodiment of sealing means, on the line II—II of Figure 4, but on a larger scale and showing two portions moved apart;

Fig. 2 is a plan view of the surface of the anvil;

Fig. 3 is a sectional view through the anvil along line III—III of Figure 2, and

Fig. 4 is a packaging machine with the front wall omitted.

Sealing means embodying the invention is to be used in a packaging machine such as that shown in Figure 4. In this, a web 4 of plastics material film is drawn from a roll 3 and guided into a forming station comprising upper and lower portions 6, 7. In this forming station successive containers 8 are formed by forming of the web after heating. The containers are then advanced to a filling station which is not shown and then to the sealing means 1. Where the packaging machine is a vacuum packaging machine the sealing means is a vacuum station. At the same time a web 10 which may e.g. be paper or plastics material is drawn from a roll 9 and advanced to the sealing means 1. The web 10 is laid over the containers 8 in the sealing means and sealed thereto. After the sealing operation the containers are separated in a separating station which is not shown.

The sealing means 1 is provided with a first and upper tool portion 12 mounted on a machine frame 11 and a second and lower tool portion 13 adapted to be raised and lowered on the frame. In the upper tool portion there is provided a heatable sealing tool 14 which seals the webs 4 and 10 to one another by heat sealing at least one of the webs being of plastics material.

The sealing tool 14 is conventionally

moved towards the lower tool by means of a pneumatic device 15 and is pulled back into the position shown in Figure 1 by means of biasing means which are not shown.

At the edges of the side walls of the lower tool portion 13 which are nearest to the webs there is provided an anvil 16 in the form of a resilient strip engaged into a T-shaped recess 17 on the side walls proper. During the sealing operation the web 4 is pushed against the anvil 16 by on the one hand the pressure of the two portions 12, 13 against one another and on the other hand the pressure exerted on the anvil 16 by the sealing tool 14 through a sealing surface 23 of that tool; the webs 4 and 10 are thereby pressed together while a seal is formed between them.

The surface 18 of the anvil 16 which is presented to the web 4 has a roughened surface structure. As shown, this is formed by milling, with elevated linear transverse zones 19 and elevated linear longitudinal zones 20 and pyramidal depressions or recesses 21 formed therebetween and having respective lowest points 22. In the example of embodiment the apex angle α of the pyramid is 90 degrees and the distance a between two successive parallel linear elevations is 0.8mm. With this structure of the surface 18 of the sealing backing 16 the elevations 19, 20 are deformed by pressure of the sealing tool 14 into a substantially smooth surface. After completion of the sealing operation the elastic material releases into the original position shown in Figures 2 and 3. We have found that such surface structure avoids adhesion between the web 4 and the anvil 16 or that a potential adhesion is immediately released with release of the pressure between the tool 14 and the anvil, and we have found it possible to produce packages such as formed of a nonpowered lined or coated lower film web and of an upper web consisting of paper, without any risk that the freshly formed joints would be torn by adherence connection between the lower film and the sealing backing.

Alternatively to the milled structure shown in figures 2 and 3 the linear longitudinal and transverse zones could be recessed and the pyramidal zones could be elevated. In this case too an adhesion between the sealing backing and the lower film would be avoided. The structure shown in figures 2 and 3 comprising elevated longitudinal and transverse zones and recessed pyramidal portions, however, provides particularly good rigidity, and furthermore the surface thus formed recovers particularly quickly to its original state.

Alternatively to the milled structure it is possible to provide the surface 18 of the anvil 16 as a knurled surface in which merely elongated elevated zones alternate with longitudinally recessed zones. With this em-

5 bodiment too, an adhesion between the lower film and the anvil is avoided: This surface, however, does not provide the same rigidity as the embodiment shown in figures 2 and 3 comprising longitudinal and transverse inter-connected elevated zones.

10 Silicone rubber is particularly well adapted as a material for the anvil 16. In the embodiment shown the thickness *b* of the silicone rubber is about 2mm.

WHAT WE CLAIM IS:—

15 1. A sealing means for peelably sealing together two webs of packaging material comprising a heatable sealing tool and an anvil arranged for relative reciprocating movement to press together and seal together those webs between them, said anvil having a resilient contacting surface facing said sealing tool, and said sealing tool having a smooth sealing surface facing said contacting surface, and wherein the said resilient contacting surface is rough, being formed of protrusions and/or depressions which cooperate with the smooth sealing surface when the two said surfaces are pressed together, with the webs to be sealed between them, to provide a substantially smooth surface exerting uneven pressure on the webs and on movement apart of the sealing tool and anvil the protrusions and/or depressions are restored to their normal position thereby ensuring disengagement of the packaging material from the said contacting surface.

35 2. A sealing means according to claim 1 wherein the resilient contacting surface is formed of a multiplicity of depressions and protrusions which are substantially uniformly spaced and discrete.

40 3. A sealing means according to claim 1 or claim 2 wherein the resilient contacting surface is provided with elevated longitudinal

and transverse zones and with pyramidal depressions.

45 4. A sealing means according to claim 1 or claim 2 wherein the resilient contacting surface is provided with indented longitudinal and transverse zones and with pyramidal protrusions.

50 5. A method of peelably sealing together two webs of packaging material including positioning the webs between a smooth sealing surface of a heatable sealing tool and a resilient contacting surface of an anvil, said sealing tool and anvil being arranged for relative reciprocating movement, pressing together said sealing tool and anvil so as to seal together the webs and moving apart said sealing tool and anvil to release the sealed webs, said resilient contacting surface of the anvil being rough, being formed of protrusions and/or depressions which on pressing together the sealing tool and anvil cooperate to provide a substantially smooth surface exerting during sealing uneven pressure on the webs against the smooth sealing surface and which on moving apart the sealing tool and anvil are restored to their normal position thereby ensuring disengagement of the packaging material from the contacting surface.

6. Sealing means substantially as herein described with reference to and as illustrated in the accompanying drawings.

75 7. Packaging machine incorporating a sealing means according to any one of the preceding claims.

8. Method of sealing substantially as herein described with reference to and as illustrated in the accompanying drawings.

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Fig.1

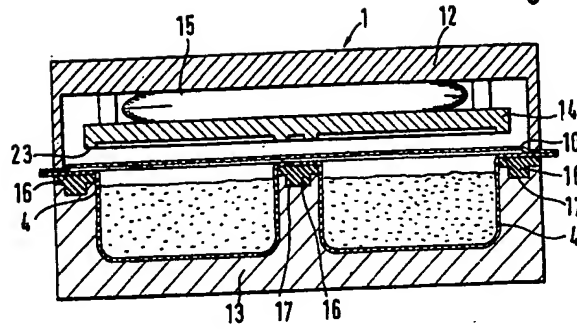


Fig.3

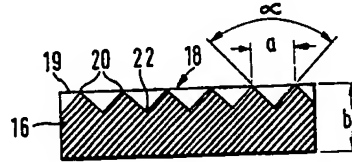
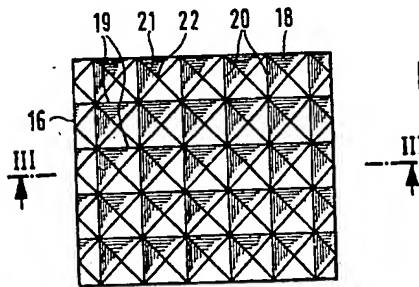


Fig.2



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Fig. 4

